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<10> Cahoon, Rebecca E.  
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Orozco, Emil M. Jr.

<120> PLANT CELL CYCLIN GENES

<130> BB1149 US NA

<140> US/09/665,308

<141> 2000-09-19

<150> 60/078,735

<151> 1998-03-20

<150> PCT/US99/06047

<151> 1999-03-19

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cgcagcggcg gtccagatcc gattacatcg aggcggtgca ggcggacgtc acggcccaca 180  
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gtgacaagct gcagctcctt ggcgttgccct ccatgctcat tgccgcgaag ttcgaggaga 360  
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caatcaagac ctctctgaga cgtttcataa gatctgccc tgaagacaag aagggtcca 540  
tcttgtaaat ggaattcttg gggagctacc tcgctgagct gactctacta gattatggct 600  
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ctgaactcaa ggattgcac gtagccatac atgacttgca gctcaacagg aaatgtccat 780  
cattaacggc aattcgagac aagtacaagc agcacaagtt caaatgcgtg tcattgatcc 840  
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actgtaccgc tgtaaggcta acaatctgag ctctccttga gctcttaggg acaagcagaa 960  
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20 25 30  
Leu Arg Ser Leu Glu Val Asp Pro Gln Arg Arg Ser Arg Ser Asp Tyr  
35 40 45  
Ile Glu Ala Val Gln Ala Asp Val Thr Ala His Met Arg Ser Ile Leu  
50 55 60

Val	Asp	Trp	Leu	Val	Glu	Val	Ala	Glu	Glu	Tyr	Lys	Leu	Val	Ala	Asp	65	70	75	80
Thr	Leu	Tyr	Leu	Thr	Ile	Ser	Tyr	Val	Asp	Arg	Phe	Leu	Ser	Val	Asn	85	90	95	
Ala	Leu	Gly	Arg	Asp	Lys	Leu	Gln	Leu	Leu	Gly	Val	Ala	Ser	Met	Leu	100	105	110	
Ile	Ala	Ala	Lys	Phe	Glu	Glu	Ile	Ser	Pro	Pro	His	Pro	Glu	Asp	Phe	115	120	125	
Cys	Tyr	Ile	Thr	Asp	Asn	Thr	Tyr	Thr	Lys	Glu	Glu	Leu	Leu	Lys	Met	130	135	140	
Glu	Ser	Asp	Ile	Leu	Lys	Leu	Leu	Lys	Phe	Glu	Leu	Gly	Asn	Pro	Thr	145	150	155	160
Ile	Lys	Thr	Phe	Leu	Arg	Arg	Phe	Ile	Arg	Ser	Ala	His	Glu	Asp	Lys	165	170	175	
Lys	Gly	Ser	Ile	Leu	Leu	Met	Glu	Phe	Leu	Gly	Ser	Tyr	Leu	Ala	Glu	180	185	190	
Leu	Ser	Leu	Leu	Asp	Tyr	Gly	Cys	Leu	Arg	Phe	Leu	Pro	Ser	Val	Val	195	200	205	
Ala	Ala	Ser	Val	Met	Phe	Val	Ala	Arg	Pro	Asp	Ile	Asp	Pro	Asn	Thr	210	215	220	
Asn	Pro	Trp	Asn	Thr	Lys	Leu	Gln	Lys	Met	Thr	Gly	Tyr	Lys	Val	Ser	225	230	235	240
Glu	Leu	Lys	Asp	Cys	Ile	Val	Ala	Ile	His	Asp	Leu	Gln	Leu	Asn	Arg	245	250	255	
Lys	Cys	Pro	Ser	Leu	Thr	Ala	Ile	Arg	Asp	Lys	Tyr	Lys	Gln	His	Lys	260	265	270	
Phe	Lys	Cys	Val	Ser	Leu	Ile	Leu	Val	Pro	Val	Val	Ile	Pro	Thr	Ser	275	280	285	
Tyr	Phe	Glu	Asp	Leu	Ala	Glu										290	295		

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tctttgtcga aaaacaatac cccaacaaga ggcagcgggt tgtgttgggt gaacttccca 180  
atttacaaaa ccttattgtc tccgaaactc aaaatnngcg caaagagaag ntcctatgtn 240  
ggaagaatcc caatgagaag aaaccatcac ccacaaacaa caacaccttt ccttcccctc 300  
agatcancga atcttatgat tcggatatcc acgggtatct tcgtgaaatg gagatgcaga 360  
ataagagaag ancaatngtt gatacattga aaaggttaga aaatcgttac ccaaccatgg 420  
agcaatntgg tgatt 435

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Val Phe Val Glu Lys Gln Tyr Pro Asn Lys Arg Gln Arg Val Val Leu  
20 25 30  
Gly Glu Leu Pro Asn Leu Gln Asn Leu Ile Val Ser Glu Thr Gln Asn  
35 40 45

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Xaa Arg Lys Glu Lys Xaa Leu Cys Xaa Lys Asn Pro Asn Glu Lys Lys  
50 55 60

Pro Ser Pro Thr Asn Asn Asn Thr Phe Pro Ser Pro Gln Ile Xaa Glu  
65 70 75 80

Ser Tyr Asp Ser Asp Ile His Gly Tyr Leu Arg Glu Met Glu Met Gln  
85 90 95

Asn Lys Arg Arg Xaa Xaa Val Asp Thr Leu Lys Arg Leu Glu  
100 105 110

<210> 5  
<211> 847  
<212> DNA  
<213> Triticum aestivum

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aaagataatg	gcaatccaca	aatgtgtgct	tcctatgctg	cagagatata	cagaaacct	180
atggctgcag	agcttataag	gagacctaaa	tcaaattaca	tggagacttt	gcaaagggat	240
atcacaaaagg	gcatgcgagg	aatcctgatt	gattgggctt	tgagggtcct	ggagggaat	300
aaacttttgc	cagacacact	atacctcact	gtatatctta	ttgatcaatt	tctttctcgg	360
aaatatattg	aaagacagaa	actacaactt	cttgggaataa	ctagcatgct	gattgcctca	420
aaatatgaag	agatctgtgc	gcctcgtgtt	gaagaatttt	gtttcataac	tgataacaca	480
tatacaaaaa	atcaggtgct	gaaaatggag	tgtgaagtgc	ttaatgatct	ggggtttcat	540
ctttcagttc	ccacaatcaa	aacgtttctg	aggagattcc	ttanagcagc	acatgcttct	600
caaaaaagcc	cttgggcaac	tttgggctat	ctggggcaat	tatcttgccg	gagttgacat	660
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aaaatggcac	ncgacatcag	actgcaang	aatccacctc	gagcatanac	tnaatcaaaa	780

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aggtata 847

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<212> PRT  
<213> Triticum aestivum

<220>  
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20 25 30  
Gly Leu Asn Val Ile Asp Ile Asp Lys Asp Asn Gly Asn Pro Gln Met  
35 40 45

~~Cys Ala Ser Tyr Ala Ala Glu Ile Tyr Arg Asn Leu Met Ala Ala Glu~~  
~~50 55 60~~

Leu Ile Arg Arg Pro Lys Ser Asn Tyr Met Glu Thr Leu Gln Arg Asp  
65 70 75 80

Ile Thr Lys Gly Met Arg Gly Ile Leu Ile Asp Trp Ala Leu Arg Phe  
85 90 95

Leu Glu Glu Tyr Lys Leu Leu Pro Asp Thr Leu Tyr Leu Thr Val Tyr  
100 105 110

Leu Ile Asp Gln Phe Leu Ser Arg Lys Tyr Ile Glu Arg Gln Lys Leu  
115 120 125

Gln Leu Leu Gly Ile Thr Ser Met Leu Ile Ala Ser Lys Tyr Glu Glu  
130 135 140

Ile Cys Ala Pro Arg Val Glu Glu Phe Cys Phe Ile Thr Asp Asn Thr  
145 150 155 160

Tyr Thr Lys Asn Gln Val Leu Lys Met Glu Cys Glu Val Leu Asn Asp  
165 170 175

Leu Gly Phe His Leu Ser Val Pro Thr Ile Lys Thr Phe Leu Arg Arg  
180 185 190

Phe Leu Xaa Ala Ala His Ala Ser Gln Lys Ser Pro Trp Ala Thr Leu  
195 200 205

Gly Tyr Leu  
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tccgcaacca ctggaggaaa aatcttttcc ttcaactttc ttccctttcc ccccgcgcat 180  
gcacgggctc tgattgacgc catgggggac gccgcggcct ccacgtccgc tcccaccacg 240  
cccacctcca tcctcatctg cctggaagac ggcagcgacc ttctcgccga tgccgacgat 300  
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accacggcga tgttccggtt cggcggaag accgcttacg tggccgtgaa ttacctcgat 540  
cgcttcctgg cgcaacggcg agtcaatagg gagcatgcgt ggggtctgca gctgctcatg 600  
gtggcgtgca tgcgctggc gaccaagctg gaggagcacc acgctccgcg gctgtcggag 660  
ttcccgctgg acgctgcga gttcgcgttc gacagcgct ccacctcgcg gatggagctc 720  
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gtggcatcca tcctcgtcgc gcgnggccgg gaggagactc ccgcccgcag cctgggagnc 960  
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<212> PRT  
<213> Zea mays

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20 25 30  
Asp Gly Ala Gly Thr Asp Leu Val Val Ala Arg Asp Glu Arg Leu Leu  
35 40 45  
Val Val Asp Gln Asp Glu Glu Tyr Val Ala Leu Leu Leu Ser Lys Glu  
50 55 60  
Ser Ala Ser Gly Gly Gly Gly Pro Val Glu Glu Met Glu Asp Trp Met  
65 70 75 80  
Lys Ala Ala Arg Ser Gly Cys Val Arg Trp Ile Ile Lys Thr Thr Ala  
85 90 95  
Met Phe Arg Phe Gly Gly Lys Thr Ala Tyr Val Ala Val Asn Tyr Leu

100	105	110
Asp Arg Phe Leu Ala Gln Arg Arg Val Asn Arg Glu His Ala Trp Gly		
115	120	125
Leu Gln Leu Leu Met Val Ala Cys Met Ser Leu Ala Thr Lys Leu Glu		
130	135	140
Glu His His Ala Pro Arg Leu Ser Glu Phe Pro Leu Asp Ala Cys Glu		
145	150	155
Phe Ala Phe Asp Ser Ala Ser Ile Leu Arg Met Glu Leu Leu Val Leu		
	165	170
Gly Thr Leu Glu Trp Arg Met Ile Ala Val Thr Pro Phe Pro Tyr Ile		
	180	185
Ser Tyr Phe Ala Ala Arg Phe Arg Glu Thr Ser Ala Gly Arg Ile Leu		
	195	200
Met Arg Ala Val Glu Cys Val Phe Ala Ala Ile Lys Val Ile Ser Ser		
210	215	220

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Val Glu Xaa Arg Pro Ser Thr Ile Ala Val Ala Ser Ile Leu
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 <213> Oryza sativa

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 agggacaagg agtgggagct gcagctcctc tcggtggcgt gcctgtcgct ggcggcgaag 180  
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 cgtcctgcmc gccatcgaat gcattctcgc tcgatcaaag tcatagctcg gtgggtacag 420  
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 <211> 181  
 <212> PRT  
 <213> Oryza sativa

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 20 25 30  
 Asp Arg Phe Leu Ala Arg Arg Cys Val Asp Arg Asp Lys Glu Trp Ala  
 35 40 45



Leu Gln Leu Leu Ser Val Ala Cys Leu Ser Leu Ala Ala Lys Val Glu  
 50 55 60  
 Glu Arg Arg Pro Pro Arg Leu Pro Glu Phe Lys Leu Asp Met Tyr Asp  
 65 70 75 80  
 Cys Ala Ser Leu Met Arg Met Glu Leu Leu Val Leu Thr Thr Leu Lys  
 85 90 95  
 Trp Gln Met Ile Thr Glu Thr Pro Phe Ser Tyr Leu Asn Cys Phe Thr  
 100 105 110  
 Ala Lys Phe Arg His Asp Glu Arg Lys Ala Ile Val Leu Arg Ala Ile  
 115 120 125  
 Glu Cys Ile Phe Ala Ser Ile Lys Val Ile Ser Ser Val Gly Tyr Gln  
 130 135 140  
 Pro Ser Thr Ile Ala Leu Ala Ala Ile Leu Ile Ala Arg Asn Lys Glu  
 145 150 155 160  
 Thr Ala Pro Asn Leu Asp Glu Leu Ser Val His Arg Leu Ala Pro Trp  
 165 170 175

Gln Leu Met Met Leu  
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 <212> DNA  
 <213> Glycine max

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 tgccaacaca atgaatgcgg aacctccgct gccgcggcg ctcctcatgt cggtttcctg 180  
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 gccggagtg ccttctccg acatcgactc ctcacctct ccgccgtcgc cgacgacaga 300  
 ggattgttat tcgatcgca gttcatcga gcacgagcgc aacttcgttc cgggattcga 360  
 gtacctgtcg cggttccaat ctcgctccct ggacgccaac gccagagaag aatcagttgg 420  
 atggattctc aaggtagacg cgtactatgg ctttcagcct ttgacggcgt acctcgccgt 480  
 caactatag tagcggtttt tggattctcg ccggttgccg gaaacaaatg ggtggcctct 540  
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 acaataataa aagaagggaag gaaaaagaga gggaataagg tgggccaagt tgtctagaaa 1260  
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 tcatccacgt tactactact ttgatgggac cctcaacagt aaagaacaat tgaagggcaa 1860  
 taagttgaag tttggctaca aatcgtggac ttttttgtt ggggtattggc acgtgtgcag 1920

tcggttctgg tgcgtgccaa tgaagtgtgt acgtgtgatt tttctttttc ttggtttttc 1980  
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<210> 12  
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 20 25 30  
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 35 40 45  
 Ser Ile Ala Ser Phe Ile Glu His Glu Arg Asn Phe Val Pro Gly Phe  
 50 55 60  
 Glu Tyr Leu Ser Arg Phe Gln Ser Arg Ser Leu Asp Ala Asn Ala Arg  
 65 70 75 80  
 Glu Glu Ser Val Gly Trp Ile Leu Lys Val His Ala Tyr Tyr Gly Phe  
 85 90 95  
 Gln Pro Leu Thr Ala Tyr Leu Ala Val Asn Tyr Met Asp Arg Phe Leu  
 100 105 110  
 Asp Ser Arg Arg Leu Pro Glu Thr Asn Gly Trp Pro Leu Gln Leu Val  
 115 120 125  
 Ser Val Ala Cys Leu Ser Leu Ala Ala Lys Met Glu Glu Pro Leu Val  
 130 135 140  
 Pro Ser Leu Leu Asp Leu Gln Ile Glu Gly Ala Lys Tyr Ile Phe Glu  
 145 150 155 160  
 Pro Arg Thr Ile Arg Arg Met Glu Leu Leu Val Leu Gly Val Leu Asp  
 165 170 175  
 Trp Arg Leu Arg Ser Val Thr Pro Leu Cys Phe Leu Ala Phe Phe Ala  
 180 185 190  
 Cys Lys Val Asp Ser Thr Gly Thr Phe Ile Arg Phe Leu Ile Ser Arg  
 195 200 205  
 Ala Thr Glu Ile Ile Val Ser Asn Ile Gln Glu Ala Ser Phe Leu Ala  
 210 215 220  
 Tyr Trp Pro Ser Cys Ile Ala Ala Ala Ala Ile Leu Thr Ala Ala Asn  
 225 230 235 240  
 Glu Ile Pro Asn Trp Ser Val Val Lys Pro Glu Asn Ala Glu Ser Trp  
 245 250 255  
 Cys Glu Gly Leu Arg Lys Glu Lys Val Ile Gly Cys Tyr Gln Leu Met  
 260 265 270  
 Gln Glu Leu Val Ile Asn Asn Asn Gln Arg Lys Leu Pro Leu Leu Lys  
 275 280 285

Val Leu Pro Gln Leu Arg Val Thr Thr Arg Thr Arg Met Arg Ser Ser  
290 295 300

Thr Val Ser Ser Phe Ser Ser Ser Ser Thr Ser Phe Ser Leu Ser  
305 310 315 320

Cys Lys Arg Arg Lys Leu Asn Asn Arg Leu Trp Val Asp Asp Lys Gly  
325 330 335

Asn Ser Glu

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<211> 1994  
<212> DNA  
<213> Glycine max

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ttcgaatacc tcaatagggt ccaatctcgc tctctcgacg cctctgccag agaagaatcc 180  
gttgcacgga ttctcaaggt gcaggcttat tacgcttttc aaccggtcac ggcttatctt 240  
tccgttaact acttgatag gttcttgaat tctcgaccgt tgccgccgaa aacgaatggg 300  
tgccactgc aacttctctc tgttgctgctc ttgtctttag cagcaaagat ggaggaatct 360  
ctagttccat ctcttttgga ccttcaggta gaagggtgcta aatacgtatt tgaacccaaa 420  
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accccattta gcttctctga tttctttgctg tgcaagttag attcaactgg gacttttacc 540  
gggttcctca tttcacgtgc tacacaaatt atcttatcta atatacaaga ggctagcttt 600  
cttgctgatt ggccatcatg cattgctgca gcagccattc tccatgcagc aaatgaaatt 660  
cctaattggt ctctcgttag gcctgagcat gcagagtcatt ggtgtgaggg gtttaagaaag 720  
gagaaaatta taggggtgcta ccaattaatg caagaacttg tgattgacaa taaccagagg 780  
aaaccccta aggtgttacc acagctgcga gtgacaatat ctcggcccat tatgaggtct 840  
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ttttgttttc tttttagtgc ctaattggct ttgggagaaa ttggagtaaa ggcctttggg 1920  
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aaaaaaaaaa aaaa 1994

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<211> 318  
<212> PRT  
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           50                          55                          60  
 Leu Lys Val Gln Ala Tyr Tyr Ala Phe Gln Pro Val Thr Ala Tyr Leu  
   65                          70                          75                          80  
 Ser Val Asn Tyr Leu Asp Arg Phe Leu Asn Ser Arg Pro Leu Pro Pro  
                           85                          90                          95  
 Lys Thr Asn Gly Trp Pro Leu Gln Leu Leu Ser Val Ala Cys Leu Ser  
                           100                          105                          110  
 Leu Ala Ala Lys Met Glu Glu Ser Leu Val Pro Ser Leu Leu Asp Leu  
           115                          120                          125  
 Gln Val Glu Gly Ala Lys Tyr Val Phe Glu Pro Lys Thr Ile Arg Arg  
           130                          135                          140  
 Met Glu Leu Leu Val Leu Gly Val Leu Asp Trp Arg Leu Arg Ser Val  
   145                          150                          155                          160

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Thr Pro Phe Ser Phe Leu Asp Phe Phe Ala Cys Lys Leu Asp Ser Thr  
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 Gly Thr Phe Thr Gly Phe Leu Ile Ser Arg Ala Thr Gln Ile Ile Leu  
                           180                          185                          190  
 Ser Asn Ile Gln Glu Ala Ser Phe Leu Ala Tyr Trp Pro Ser Cys Ile  
           195                          200                          205  
 Ala Ala Ala Ala Ile Leu His Ala Ala Asn Glu Ile Pro Asn Trp Ser  
           210                          215                          220  
 Leu Val Arg Pro Glu His Ala Glu Ser Trp Cys Glu Gly Leu Arg Lys  
   225                          230                          235                          240  
 Glu Lys Ile Ile Gly Cys Tyr Gln Leu Met Gln Glu Leu Val Ile Asp  
                           245                          250                          255  
 Asn Asn Gln Arg Lys Pro Pro Lys Val Leu Pro Gln Leu Arg Val Thr  
                           260                          265                          270  
 Ile Ser Arg Pro Ile Met Arg Ser Ser Val Ser Ser Phe Leu Ala Ser  
           275                          280                          285  
 Ser Ser Ser Pro Ser Ser Ser Ser Leu Ser Cys Arg Arg Arg Lys Leu  
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 <211> 570  
 <212> DNA  
 <213> Triticum aestivum

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<222> (515)..(516)  
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<222> (558)  
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gagatttggg ctccagagggt gaacgacttc atattgttct cgcacaacac atatactagg 180  
gagcagattc tgaggatgga gaaggcaatc ctgaacatgc ttgagtggaa cctgacagtg 240  
cccacacctt acgtcttcct cgtgtgattc gccaaaggccg catcctcctg agataagaag 300  
aacggcaagg aggtaaaagg aacaccagat ttaacaaat cctcagatgt agtacgtatc 360  
tccatttgcc aaacatgatc tattgctgaa ttctgttctc cctgggtgat tgtctaaatg 420  
gagacacgtc tttttttcgt ggactggcgc tctgtagtat ggacagaata tgtttgattc 480  
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taacattata cttctcanag accacttttg 570

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<211> 75  
<212> PRT  
<213> Triticum aestivum

<220>  
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<400> 16  
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20 25 30  
Ser Asp Asn Thr Tyr Thr Arg Glu Gln Ile Leu Arg Met Glu Lys Ala  
35 40 45  
Ile Leu Asn Met Leu Glu Trp Asn Leu Thr Val Pro Thr Pro Tyr Val  
50 55 60  
Phe Leu Val Xaa Phe Ala Lys Ala Ala Ser Ser  
65 70 75

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<211> 1932  
<212> DNA  
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accagccacc cagcactcca gccgccagac cagagtctnc ggccgcgcgc tcgcacgaca 180
ggagagggag agatacgcgg gctttgactt gccgcgggtg cgtccgtgcg tgcttggtgg 240
gaatagtggg agacgcgggt acagtacagg agccatggcg ccgagctgct acgacgcggc 300
agcgtccatg ctctctcgcg ccgaggagca cagcagcatc ctgtggtacg aggaggagga 360
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cggcgcgggc ttgttcccgc cgcagtcgga ggaatgcgtg gccggctctg tgagcgggga 480
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ctgcgtccgc cgggaggccg tcgactggat ttggaaggct tacacgcacc acaggttccg 600
ccctctcact gcctacttgg cagtgaacta cctcgatcgc ttcctctcgc tgtctgaggt 660
gccggactgc aaggactgga tgacgcagct cctcgcggtg gcgtgcgttt ctctggccgc 720
caagatggag gaaaccgccc tcccgcagtg cctggacett caggaggctg gagacgcgcg 780
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<210> 18
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<212> PRT
<213> Zea mays

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35 40 45
Phe Gly Ala Asp Leu Phe Pro Pro Gln Ser Glu Glu Cys Val Ala Gly
50 55 60
Leu Val Glu Arg Glu Arg Asp His Met Pro Gly Pro Cys Tyr Gly Asp
65 70 75 80
Arg Leu Arg Gly Gly Gly Gly Cys Leu Cys Val Arg Arg Glu Ala Val
85 90 95
Asp Trp Ile Trp Lys Ala Tyr Thr His His Arg Phe Arg Pro Leu Thr
100 105 110
Ala Tyr Leu Ala Val Asn Tyr Leu Asp Arg Phe Leu Ser Leu Ser Glu
115 120 125

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Val Pro Asp Cys Lys Asp Trp Met Thr Gln Leu Leu Ala Val Ala Cys  
 130 135 140  
 Val Ser Leu Ala Ala Lys Met Glu Glu Thr Ala Val Pro Gln Cys Leu  
 145 150 155 160  
 Asp Leu Gln Glu Val Gly Asp Ala Arg Tyr Val Phe Glu Ala Lys Thr  
 165 170 175  
 Val Gln Arg Met Glu Leu Leu Val Leu Thr Thr Leu Asn Trp Arg Met  
 180 185 190  
 His Ala Val Thr Pro Phe Ser Tyr Val Asp Tyr Phe Leu Asn Lys Leu  
 195 200 205  
 Asn Asn Gly Gly Ser Thr Ala Pro Arg Ser Cys Trp Leu Leu Gln Ser  
 210 215 220  
 Ala Glu Leu Ile Leu Arg Ala Ala Arg Gly Thr Gly Cys Val Gly Phe  
 225 230 235 240  
 Arg Pro Ser Glu Ile Ala Ala Ala Val Ala Ala Val Ala Gly Asp  
 245 250 255

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Val Asp Asp Ala Asp Gly Val Glu Asn Ala Cys Cys Ala His Val Asp  
 260 265 270  
 Lys Glu Arg Val Leu Arg Cys Gln Glu Ala Ile Gly Ser Met Ala Ser  
 275 280 285  
 Ser Ala Ala Ile Asp Asp Ala Thr Val Pro Pro Lys Ser Ala Arg Arg  
 290 295 300  
 Arg Ser Ser Pro Val Pro Val Pro Gln Ser Pro Val Gly Val Leu Asp  
 305 310 315 320  
 Ala Ala Pro Cys Leu Ser Tyr Arg Ser Glu Glu Ala Ala Thr Ala Thr  
 325 330 335  
 Ala Thr Ala Thr Ser Ala Ala Ser His Gly Ala Pro Gly Ser Ser Ser  
 340 345 350  
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 Arg Cys Asp Gly Ser Cys Ser Asp Arg Ser Lys Arg Ala Pro Ala Gln  
 370 375 380

Trp Thr Lys Glu  
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tctccgccgn cgacatccag aggggagagg agttcatgtt cgacgaggcg aaaatccagc 180  
gcatggagca gatggtgctc aacgcgctgg agtggcggac gcgctccgtc acgccgctcg 240  
ccttcctcgg nttctttctc tccgcgtggt tcccgcgaagc cgcggcaccc ggcgctgctc 300  
gatgccatca nggcccgcgc gtcgagctcc tcctccgcgt ctaagccggg angtgaacna 360  
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t 481

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<213> Oryza sativa  
<223> Xaa = ANY AMINO ACID

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Arg Ala Ala Ala Ile Ser Ala Xaa Asp Ile Gln Arg Gly Glu Glu Phe  
35 40 45  
Met Phe Asp Glu Ala Lys Ile Gln Arg Met Glu Gln Met Val Leu Asn  
50 55 60  
Ala Leu Glu Trp Arg Thr Arg Ser Val Thr Pro Leu Ala Phe Leu Gly



Ala Phe Ser Cys Ser Thr Asp Leu Ile Leu Ser Thr Thr Lys Xaa Ala  
                             85                            90                            95  
 Asp Phe Leu Val Phe Arg His Ser Glu Ile Ala Gly Ser Val Ala Leu  
                             100                            105                            110  
 Pro Ser Phe Gly Glu His Lys Thr Ser Val Val Glu Met Ala Thr Thr  
                             115                            120                            125  
 Asn Cys Lys Tyr Ile Asn Lys Gly Val Xaa Cys Asp Arg Lys Asp Pro  
                             130                            135                            140  
 Asp Glu Val Leu Pro Leu Trp Asn Ala Tyr Leu Lys Phe Gly Leu Arg  
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 <212> DNA  
 <213> Zea mays

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tgatcacagc	cgccgccggc	gacggcggcg	acggcgacgg	cgacacggag	ctcctggcgc	540
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tcagctgcga	gagctcgacg	tccgccaccg	ctatggctgc	ggcggtcggc	ccgtgggcgc	780
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cagcgcgggc	gtcggcgctg	gcgtcggcgt	cagccggggg	cgccgccacc	gtccaggtec	900
cgcatcagct	accccccgac	gaggagagcc	gcgacgcctg	gccgtccacc	tgcgccgcgt	960
gacgcaccgt	gccggaaacg	gtgcctatgg	cgagaccgcc	gttcgggtgg	ggtggagaat	1020
ggagaacaag	gagcatcatt	ggctcgcgtc	ggtgagcagg	agaacgaact	attttgccca	1080
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<211> 318

<212> PRT

<213> Zea mays

<400> 24

Asn	Ser	Ala	Arg	Ala	Ala	Val	Gly	Trp	Val	Ser	Arg	Ala	Ala	Ala	Arg
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Leu	Gly	Phe	Ser	Ala	Leu	Thr	Ala	Ala	Leu	Ala	Ala	Ala	Tyr	Leu	Asp
			20					25					30		
Arg	Cys	Phe	Leu	Pro	Gly	Gly	Ala	Leu	Arg	Leu	Gly	Asp	Gln	Pro	Trp
		35					40					45			
Met	Ala	Arg	Leu	Ala	Ala	Val	Thr	Cys	Phe	Ala	Leu	Ala	Ala	Lys	Val
	50					55					60				
Glu	Glu	Thr	Arg	Val	Pro	Pro	Leu	Leu	Asp	Leu	Gln	Leu	Tyr	Ala	Ala
65					70					75				80	
Ala	Asp	Ala	Ala	Asp	Pro	Tyr	Val	Phe	Glu	Ala	Lys	Thr	Val	Arg	Arg
				85					90					95	
Met	Glu	Leu	Leu	Val	Leu	Ser	Ala	Leu	Gly	Trp	Arg	Met	His	Pro	Val
		100						105					110		
Thr	Pro	Phe	Ser	Tyr	Leu	Gln	Pro	Val	Leu	Ala	Asp	Ala	Ala	Thr	Arg
	115						120					125			
Leu	Arg	Ser	Cys	Glu	Gly	Val	Leu	Leu	Ala	Val	Met	Ala	Asp	Trp	Arg
	130					135					140				
Trp	Pro	Arg	His	Arg	Pro	Ser	Ala	Trp	Ala	Ala	Ala	Ala	Leu	Leu	Ile
145					150					155					160
Thr	Ala	Ala	Ala	Gly	Asp	Gly	Gly	Asp	Gly	Asp	Gly	Asp	Thr	Glu	Leu
				165				170						175	

Leu Ala Leu Ile Asn Ala Pro Glu Asp Lys Thr Ala Glu Cys Ala Lys  
 180 185 190  
 Ile Ile Ser Glu Val Thr Gly Met Ser Phe Leu Ala Cys Asp Val Gly  
 195 200 205  
 Val Ser Ala Gly Asn Lys Arg Lys His Ala Ala Ala Gln Leu Tyr Ser  
 210 215 220  
 Pro Pro Pro Ser Pro Ser Gly Val Ile Gly Ala Leu Ser Cys Phe Ser  
 225 230 235 240  
 Cys Glu Ser Ser Thr Ser Ala Thr Ala Met Ala Ala Ala Val Gly Pro  
 245 250 255  
 Trp Ala Pro Ser Ala Ser Val Ser Val Ser Ser Ser Pro Glu Pro Pro  
 260 265 270  
 Gly Arg Ala Pro Lys Arg Ala Ala Ala Ser Ala Ser Ala Ser Ala  
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 Ser Ala Gly Val Ala Pro Pro Val Gln Val Pro His Gln Leu Pro Pro  
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Asp Glu Glu Ser Arg Asp Ala Trp Pro Ser Thr Cys Ala Ala  
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<210> 25  
 <211> 674  
 <212> DNA  
 <213> Glycine max

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 <223> n = A, C, G or T

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 cttaccacca tcaaaaatcc cttttggaca ccctatactg ctccgaagag cattggatag 180  
 gggaagggtga atttgaccaa gcagaggagg agtacggtaa cagtaatagc aatagtagca 240  
 gcaccttagt aaacaactcc cctgagtcct cccctcattt gttgctcgaa agcgacatgt 300  
 tttgggacga acaagagttg gcatcgctgt tggagaaaga acaacacaac ccactaagca 360  
 cttgctgtct ccaaagcaac cctgccttgg aggggtgctcg catagaagcc gtggagtggg 420  
 ttctcaaagt aaacgcccac tactccttct ctgccctcac cgctgttctt gctgtcaact 480  
 actttgaccg ttttctcttc agcttccgct ttcagaatga cattaancca tggatgactc 540  
 ggggtcgctg ccgtcgcttg nctctccctc gctgccaaag tgggcgagac acacgttccc 600  
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 gacgattaaa aaag 674

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 <212> PRT  
 <213> Glycine max  
 <223> Xaa = ANY AMINO ACID

<220>  
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 <222> (137)  
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<220>  
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<400> 26

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Glu	Glu	His	Trp	Ile	Gly	Glu	Gly	Glu	Phe	Asp	Gln	Ala	Glu	Glu	Glu	20	25	30	
Tyr	Gly	Asn	Ser	Asn	Ser	Asn	Ser	Ser	Ser	Thr	Leu	Val	Asn	Asn	Ser	35	40	45	
Pro	Glu	Ser	Ser	Pro	His	Leu	Leu	Leu	Glu	Ser	Asp	Met	Phe	Trp	Asp	50	55	60	
Glu	Gln	Glu	Leu	Ala	Ser	Leu	Leu	Glu	Lys	Glu	Gln	His	Asn	Pro	Leu	65	70	75	
Ser	Thr	Cys	Cys	Leu	Gln	Ser	Asn	Pro	Ala	Leu	Glu	Gly	Ala	Arg	Ile	85	90	95	
Glu	Ala	Val	Glu	Trp	Ile	Leu	Lys	Val	Asn	Ala	His	Tyr	Ser	Phe	Ser	100	105	110	
Ala	Leu	Thr	Ala	Val	Leu	Ala	Val	Asn	Tyr	Phe	Asp	Arg	Phe	Leu	Phe	115	120	125	
Ser	Phe	Arg	Phe	Gln	Asn	Asp	Ile	Xaa	Pro	Trp	Met	Thr	Arg	Gly	Arg	130	135	140	
Cys	Arg	Arg	Leu	Xaa	Leu	Pro	Arg	Cys	Gln	Ser	Gly	Arg	Asp	Thr	Arg	145	150	155	
Ser	Leu	Ser	Tyr	Leu	Thr	Leu	Gln	Gln	Ser	Gly	Arg	Arg	Ser	Xaa	Xaa	165	170	175	
Phe	Val	Pro	Ser	Gln	Arg	Arg	Leu	Lys	Lys	180	185								

<210> 27  
 <211> 554  
 <212> DNA  
 <213> Glycine max

<400> 27

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tgttttcttt ttataatgaa caaagaactg cacaccctct tcttcaccga agaagaagat 180
ggcaattcag caccacaatg accaactaga gcataatgaa aatgtctcat ctgtccttga 240
tgccctttac tgtgacgaag gaaagtggga agaggaagag gaggagaaag aagaagaaga 300
agatgaaggt gaaaatgaaa gtgaagtgaac aacaacact gcaacttgtc ttttcctct 360
gctcttggtg gagcaagact tgttctggga agatgaggaa ctaaaactcta tcttttccaa 420
agagaaggtt caacatgaag aagcctatgg tataacaatc tgaacagtga tgtgtataac 480
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tgatgatgct gaat 554

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<212> PRT  
<213> Glycine max

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Ser Ser Val Leu Asp Ala Leu Tyr Cys Asp Glu Gly Lys Trp Glu Glu  
20 25 30

Glu Glu Glu Glu Lys Glu Glu Glu Glu Asp Glu Gly Glu Asn Glu Ser  
35 40 45

Glu Val Thr Thr Asn Thr Ala Thr Cys Leu Phe Pro Leu Leu Leu Leu  
50 55 60

Glu Gln Asp Leu Phe Trp Glu Asp Glu Glu Leu Asn Ser Ile Phe Ser  
65 70 75 80

Lys Glu Lys Val Gln His Glu Glu Ala Tyr Gly Ile Thr Ile  
85 90

<210> 29  
<211> 372  
<212> PRT  
<213> Catharanthus roseus

<400> 29  
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Arg Ala Val Glu Ala Met Ala Ala Ser Glu Gln Gln Arg Pro Ser Lys  
20 25 30

Lys Arg Val Val Leu Gly Glu Leu Lys Asn Leu Ser Ser Asn Ile Ser  
35 40 45

Ser Ile Gln Thr Tyr Asp Phe Ser Ser Gly Pro Gln Lys Gln Gln Lys  
50 55 60

Asn Lys Asn Lys Arg Lys Ala Lys Glu Ser Leu Gly Phe Glu Val Lys  
65 70 75 80

Glu Lys Lys Val Glu Glu Ala Gly Ile Asp Val Phe Ser Gln Ser Asp  
85 90 95

Asp Pro Gln Met Cys Gly Ala Tyr Val Ser Asp Ile Tyr Glu Tyr Leu  
100 105 110

His Lys Met Glu Met Glu Thr Lys Arg Arg Pro Leu Pro Asp Tyr Leu  
115 120 125

Asp Lys Val Gln Lys Asp Val Thr Ala Asn Met Arg Gly Val Leu Ile

130                      135                      140  
 Asp Trp Leu Val Glu Val Ala Glu Glu Tyr Lys Leu Leu Pro Asp Thr  
 145                      150                      155                      160  
 Leu Tyr Leu Thr Val Ser Tyr Ile Asp Arg Phe Leu Ser Met Asn Ala  
                     165                      170                      175  
 Leu Ser Arg Gln Lys Leu Gln Leu Leu Gly Val Ser Ser Met Leu Ile  
                     180                      185                      190  
 Ala Ser Lys Tyr Glu Glu Ile Ser Pro Pro His Val Glu Asp Phe Cys  
                     195                      200                      205  
 Tyr Ile Thr Asp Asn Thr Tyr Lys Lys Glu Glu Val Val Lys Met Glu  
                     210                      215                      220  
 Ala Asp Val Leu Lys Phe Leu Lys Phe Glu Met Gly Asn Pro Thr Ile  
 225                      230                      235                      240  
 Lys Thr Phe Leu Arg Arg Leu Thr Arg Val Val Gln Asp Gly Asp Lys  
                     245                      250                      255

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Asn Pro Asn Leu Gln Phe Glu Phe Leu Gly Tyr Tyr Leu Ala Glu Leu  
                     260                      265                      270  
 Ser Leu Leu Asp Tyr Gly Cys Val Lys Phe Leu Pro Ser Leu Ile Ala  
                     275                      280                      285  
 Ser Ser Val Ile Phe Leu Ser Arg Phe Thr Leu Gln Pro Lys Val His  
                     290                      295                      300  
 Pro Trp Asn Ser Leu Leu Gln His Asn Ser Gly Tyr Lys Pro Ala Asp  
 305                      310                      315                      320  
 Leu Lys Glu Cys Val Leu Ile Ile His Asp Leu Gln Leu Ser Lys Arg  
                     325                      330                      335  
 Gly Ser Ser Leu Val Ala Val Arg Asp Lys Tyr Lys Gln His Lys Phe  
                     340                      345                      350  
 Lys Cys Val Ser Thr Leu Thr Ala Pro Pro Ser Ile Pro Asp Glu Phe  
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 Phe Glu Asp Ile  
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<210> 30  
 <211> 335  
 <212> PRT  
 <213> Arabidopsis thaliana

<400> 30  
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 1                      5                      10                      15  
 Ser Asn Asp Met Asp Leu Phe Cys Gly Glu Asp Ser Gly Val Phe Ser  
                     20                      25                      30  
 Gly Glu Ser Thr Val Asp Phe Ser Ser Ser Glu Val Asp Ser Trp Pro  
                     35                      40                      45  
 Gly Asp Ser Ile Ala Cys Phe Ile Glu Asp Glu Arg His Phe Val Pro  
 50                      55                      60  
 Gly His Asp Tyr Leu Ser Arg Phe Gln Thr Arg Ser Leu Asp Ala Ser



65	70	75	80
Ala Arg Glu Asp Ser Val Ala Trp Ile Leu Lys Val Gln Ala Tyr Tyr	85	90	95
Asn Phe Gln Pro Leu Thr Ala Tyr Leu Ala Val Asn Tyr Met Asp Arg	100	105	110
Phe Leu Tyr Ala Arg Arg Leu Pro Glu Thr Ser Gly Trp Pro Met Gln	115	120	125
Leu Leu Ala Val Ala Cys Leu Ser Leu Ala Ala Lys Met Glu Glu Ile	130	135	140
Leu Val Pro Ser Leu Phe Asp Phe Gln Val Ala Gly Val Lys Tyr Leu	145	150	155
Phe Glu Ala Lys Thr Ile Lys Arg Met Glu Leu Leu Val Leu Ser Val	165	170	175
Leu Asp Trp Arg Leu Arg Ser Val Thr Pro Phe Asp Phe Ile Ser Phe	180	185	190
Phe Ala Tyr Lys Ile Asp Pro Ser Gly Thr Phe Leu Gly Phe Phe Ile	195	200	205
Ser His Ala Thr Glu Ile Ile Leu Ser Asn Ile Lys Glu Ala Ser Phe	210	215	220
Leu Glu Tyr Trp Pro Ser Ser Ile Ala Ala Ala Ile Leu Cys Val	225	230	235
Ala Asn Glu Leu Pro Ser Leu Ser Ser Val Val Asn Pro His Glu Ser	245	250	255
Pro Glu Thr Trp Cys Asp Gly Leu Ser Lys Glu Lys Ile Val Arg Cys	260	265	270
Tyr Arg Leu Met Lys Ala Met Ala Ile Glu Asn Asn Arg Leu Asn Thr	275	280	285
Pro Lys Val Ile Ala Lys Leu Arg Val Ser Val Arg Ala Ser Ser Thr	290	295	300
Leu Thr Arg Pro Ser Asp Glu Ser Ser Ser Pro Cys Lys Arg Arg Lys	305	310	315
Leu Ser Gly Tyr Ser Trp Val Gly Asp Glu Thr Ser Thr Ser Asn	325	330	335
<210> 31			
<211> 354			
<212> PRT			
<213> Nicotiana tabacum			
<400> 31			
Met Ala Ala Asp Asn Ile Tyr Asp Phe Val Ala Ser Asn Leu Leu Cys	1	5	10
Thr Glu Thr Lys Ser Leu Cys Phe Asp Asp Val Asp Ser Leu Thr Ile	20	25	30
Ser Gln Gln Asn Ile Glu Thr Lys Ser Lys Asp Leu Ser Phe Asn Asn	35	40	45
Gly Ile Arg Ser Glu Pro Leu Ile Asp Leu Pro Ser Leu Ser Glu Glu			

50					55					60					
Cys	Leu	Ser	Phe	Met	Val	Gln	Arg	Glu	Met	Glu	Phe	Leu	Pro	Lys	Asp
65					70					75					80
Asp	Tyr	Val	Glu	Arg	Leu	Arg	Ser	Gly	Asp	Leu	Asp	Leu	Ser	Val	Arg
				85					90					95	
Lys	Glu	Ala	Leu	Asp	Trp	Ile	Leu	Lys	Ala	His	Met	His	Tyr	Gly	Phe
			100					105					110		
Gly	Glu	Leu	Ser	Phe	Cys	Leu	Ser	Ile	Asn	Tyr	Leu	Asp	Arg	Phe	Leu
		115					120					125			
Ser	Leu	Tyr	Glu	Leu	Pro	Arg	Ser	Lys	Thr	Trp	Thr	Val	Gln	Leu	Leu
	130					135					140				
Ala	Val	Ala	Cys	Leu	Ser	Leu	Ala	Ala	Lys	Met	Glu	Glu	Ile	Asn	Val
145				150						155					160
Pro	Leu	Thr	Val	Asp	Leu	Gln	Val	Gly	Asp	Pro	Lys	Phe	Val	Phe	Glu
				165					170					175	

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Gly	Lys	Thr	Ile	Gln	Arg	Met	Glu	Leu	Leu	Val	Leu	Ser	Thr	Leu	Lys
			180					185					190		
Trp	Arg	Met	Gln	Ala	Tyr	Thr	Pro	Tyr	Thr	Phe	Ile	Asp	Tyr	Phe	Met
		195					200					205			
Arg	Lys	Met	Asn	Gly	Asp	Gln	Ile	Pro	Ser	Arg	Pro	Leu	Ile	Ser	Gly
		210				215					220				
Ser	Met	Gln	Leu	Ile	Leu	Ser	Ile	Ile	Arg	Ser	Ile	Asp	Phe	Leu	Glu
225				230						235					240
Phe	Arg	Ser	Ser	Glu	Ile	Ala	Ala	Ser	Val	Ala	Met	Ser	Val	Ser	Gly
				245					250					255	
Glu	Ile	Gln	Ala	Lys	Asp	Ile	Asp	Lys	Ala	Met	Pro	Cys	Phe	Phe	Ile
			260					265					270		
His	Leu	Asp	Lys	Gly	Arg	Val	Gln	Lys	Cys	Val	Glu	Leu	Ile	Gln	Asp
		275					280					285			
Leu	Thr	Thr	Ala	Thr	Ile	Thr	Thr	Ala	Ala	Ala	Ala	Ser	Leu	Val	Pro
		290				295					300				
Gln	Ser	Pro	Ile	Gly	Val	Leu	Glu	Ala	Ala	Ala	Cys	Leu	Ser	Tyr	Lys
305				310						315					320
Ser	Gly	Asp	Glu	Arg	Thr	Val	Gly	Ser	Cys	Thr	Thr	Ser	Ser	His	Thr
				325					330					335	
Lys	Arg	Arg	Lys	Leu	Asp	Thr	Ser	Ser	Leu	Glu	His	Gly	Thr	Ser	Glu
			340					345					350		

Lys Leu

<210> 32  
 <211> 373  
 <212> PRT  
 <213> Nicotiana tabacum

<400> 32  
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	20	25	30
Val Asp Asp	Glu Thr Ile Ile	Thr Pro Leu Ser Ser	Glu Val Thr Thr
	35	40	45
Thr Thr Thr	Thr Thr Lys	Pro Asn Ser Leu Leu	Pro Leu Leu Leu
	50	55	60
Leu Glu Gln	Asp Leu Phe Trp	Glu Asp Glu Glu	Leu Leu Ser Leu Phe
	65	70	75
Ser Lys Glu	Lys Glu Thr His	Cys Trp Phe Asn Ser	Phe Gln Asp Asp
	85	90	95
Ser Leu Leu	Cys Ser Ala Arg	Val Asp Ser Val	Glu Trp Ile Leu Lys
	100	105	110
Val Asn Gly	Tyr Tyr Gly Phe	Ser Ala Leu Thr	Ala Val Leu Ala Ile
	115	120	125
Asn Tyr Phe	Asp Arg Phe Leu	Thr Ser Leu His	Tyr Gln Lys Asp Lys
	130	135	140
Pro Trp Met	Ile Gln Leu Ala	Ala Val Thr Cys	Leu Ser Leu Ala Ala
	145	150	155
Lys Val Glu	Glu Thr Gln Val	Pro Leu Leu Leu	Asp Phe Gln Val Glu
	165	170	175
Asp Ala Lys	Tyr Val Phe Glu	Ala Lys Thr Ile	Gln Arg Met Glu Leu
	180	185	190
Leu Val Leu	Ser Ser Leu Lys	Trp Arg Met Asn	Pro Val Thr Pro Leu
	195	200	205
Ser Phe Leu	Asp His Ile Ile	Arg Arg Leu Gly	Leu Arg Asn Asn Ile
	210	215	220
His Trp Glu	Phe Leu Arg Arg	Cys Glu Asn Leu	Leu Leu Ser Ile Met
	225	230	235
Ala Asp Cys	Arg Phe Val Arg	Tyr Met Pro Ser	Val Leu Ala Thr Ala
	245	250	255
Ile Met Leu	His Val Ile His	Gln Val Glu Pro	Cys Asn Ser Val Asp
	260	265	270
Tyr Gln Asn	Gln Leu Leu Gly	Val Leu Lys Ile	Asn Lys Glu Lys Val
	275	280	285
Asn Asn Cys	Phe Glu Leu Ile	Ser Glu Val Cys	Ser Lys Pro Ile Ser
	290	295	300
His Lys Arg	Lys Tyr Glu Asn	Pro Ser His Ser	Pro Ser Gly Val Ile
	305	310	315
Asp Pro Ile	Tyr Ser Ser Glu	Ser Ser Asn Asp	Ser Trp Asp Leu Glu
	325	330	335
Ser Thr Ser	Ser Tyr Phe Pro	Val Phe Lys Lys	Ser Arg Val Gln Glu
	340	345	350
Gln Gln Met	Lys Leu Ala Ser	Ser Ile Ser Arg	Val Phe Val Glu Ala

355

360

365

Val Gly Ser Pro His  
370

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